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AUTHOR Parker, Steve
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ABSTRACT

A study examined the phonological status of laminal sibilants in Chamicuro, a Maipuran Arawakan language spoken in the Amazonian lowlands of eastern Peru. The phonemic inventory of these sibilants shows a very strong symmetry of three affricates and three corresponding fricatives. However, when the laminal alveolar fricative is considered, the pattern of distribution becomes more complicated. Specifically, it is very difficult to account for the occurrence of syllable-final laminal alveolar fricatives in a simple and elegant way. Two possible solutions emerge. One is to claim that whenever the phoneme occurs in a syllable-final position it is an allophone of another phoneme. The other involves positing an underlying sequence that coalesces to form the laminal alveolar fricative. The phonological facts examined in this analysis appear to point to the latter explanation. Additional data on other forms that further illustrate the phonological patterns discussed are appended. (MSE)

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LAMINAL SIBILANTS IN CHAMICURO*

Steve Parker

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1 Introduction

This paper examines the phonological status of laminal sibilants in Chamicuro. Chamicuro is a Maipuran Arawakan language spoken in the Amazonian lowlands of Eastern Peru. The phonemic inventory of Chamicuro sibilants exhibits a very strong symmetry of three affricates and three corresponding fricatives. However, when the laminal alveolar fricative [s̆] is considered, the pattern of distribution becomes more complicated. Specifically, it is very difficult to account for the occurrence of syllable-final [s̆]'s in a simple and elegant way. Two possible solutions are outlined and discussed, and the advantages and disadvantages of each one are evaluated.

2 Syllable-initial sibilant phonemes

The phonemic inventory of Chamicuro sibilants exhibits the following symmetry:

(1)

	alveolar	alveopalatal	retroflexed alveopalatal
voiceless affricates	t^s	č	ç
voiceless fricatives	s	š	ş

In syllable-initial position, any of the three affricates can occur before any of the five vowel phonemes of Chamicuro (/i e a o u/). Thus the following phonetic sequences can arise:

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(2) t^si t^se t^sa t^so t^su

čі če ča čoču

čі če ča čo ču

On the other hand, the phonetic distribution of the sibilant fricatives is, in general, much more limited than that of the affricates. The phoneme /s/ can occur in syllable-initial position before any of the five vowels; thus

(3) si se sa so su

are all well-formed syllables attested in Chamicuro. The two alveopalatal fricatives, nevertheless, exhibit a more limited distribution: phonetically, [š] occurs only before the vowel /a/, and never before any of the other vowels:

(4) (*ši) (*še) ša (*šo) (*šu).

The retroflexed [ʂ] occurs only before back vowels and never before front vowels:

(5) (*ʂi) (*ʂe) ʂa ʂo ʂu.

At first glance it might appear that [š] and [ʂ] could be allophones of the same phoneme, especially due to the very limited distribution of [š]. However, when all of the relevant factors are considered, it becomes clear that [š] and [ʂ] belong to distinct phonemes. First of all, there is abundant evidence that these two segments contrast before the vowel /a/. Consider, for example, the following data[1]:

(6)>	#ša...			#ʂa...	
a.	[šaçúɬlo]	'young'	d.	[ʂaʎóta]	'macaw'
b.	[šána]	'in, on, at, to'	e.	[ʂáma]	'skirt'
c.	[šawalásko]	'midnight'	f.	[ʂaWkódlo]	'thick'

(7)>	...Vša...			...Vʂa...	
a.	[išakatiskádle]	'abandoned'	d.	[iʂakatu$^{?}$kudlú$^{?}$to]	'toy'
b.	[mašána]	'he,him'	e.	[kaʂáma]	'mushroom'
c.	[mašapulísta]	'first'	f.	[matóʂa]	'rodent sp.'

Furthermore, when additional data are considered, it becomes evident that the phoneme /š/ does occur before front vowels, although in this position the underlying /š/ is modified phonetically and surfaces as one of two varieties of the laminal alveolar fricative [s̆]:

(8)>	/s̆i.../			/s̆e.../	
a.	[s̆íhpa]	'hand'	d.	[s̆ʸéʔs̆o]	'fish sp.'
b.	[s̆iléti]	'rat'	e.	[s̆ʸénu]	'hair'
c.	[s̆ikečpádlo]	'witch'			

(9)>	/...Vši.../			/...Vše.../	
a.	[e:s̆íli]	'fish sp.'	d.	[ames̆ʸéta]	'knife'
b.	[maš̆ilikéli]	'anteater'	e.	[kaš̆ʸelísple]	'snake sp.'
c.	[mu:s̆íhki]	'peanut'	f.	[wuš̆ʸeléʔti]	'I die'

These words just presented in (8) and (9) illustrate the occurrence of the laminal alveolar fricative [s̆] and its palatalized variant [s̆ʸ]. Both of these sounds are similar to the apical alveolar fricative [s], except that the laminals are pronounced using the tongue blade rather than the tongue tip. The laminal fricatives [s̆] and [s̆ʸ] contrast with the apical fricative [s] since [s] can also occur before the front vowels /i/ and /e/ (see diagram (3)). Thus, [s̆] and [s̆ʸ] cannot be allophones of the phoneme /s/.

It should be clear, however, that the laminal alveolar fricatives can be analyzed as fronted allophones of the phoneme /š/, since all three of these sounds are in complementary distribution: [s̆] occurs always and only before /i/; [s̆ʸ] occurs always and only before /e/; and [š] occurs always and only before /a/. Thus it seems logical to posit that the phoneme /š/ is fronted and realized as a laminal alveolar fricative before front vowels.

Before this analysis can be firmly accepted, however, one other possibility should also be considered. Recall that the retroflexed alveopalatal fricative /s̱/ also exhibits a limited distribution: it occurs only before back vowels and never before front vowels. Thus the alveolar fricatives [s̆] and [s̆ʸ] are in complementary distribution not only with [š], but also with [s̱]. Therefore, it must be asked whether the laminal alveolars might be allophones of the phoneme /s̱/ rather than of the phoneme /š/.

When all of the relevant facts are taken into consideration, however, it becomes clear that it is indeed correct to derive the laminal alveolar allophones from the phoneme /š/ rather than from the retroflexed /s̱/. First, the laminal alveolars are more similar

phonetically to [š] than they are to [ṣ]. The latter is articulated farther back in the mouth than the non-retroflexed [š] is. Thus, on the basis of phonetic similarity, /š/ should be favored over /ṣ/ as the underlying representation of [s̆] and [s̆ʸ]. Secondly, the representation of [s̆] and [s̆ʸ] as allophones of /š/ rather than of /ṣ/ seems to be more psychologically real to the native Chamicuro speakers with whom I have worked. When I pronounce words containing [s̆] and [s̆ʸ] with [š] in place of the laminal alveolars, they are judged to be acceptable pronunciations by the Chamicuro speakers. However, when I substitute [ṣ] in place of the laminal alveolars in those same words, they are clearly rejected as being incorrect pronunciations. Finally, the phonological distribution of the proposed alveopalatal phonemes is much more natural when /š/ is posited as the underlying representation of the laminal alveolar fricatives. In that case, the phoneme /š/ occurs before the three non-round vowels /i/, /e/, and /a/, whereas the retroflexed /ṣ/ also occurs before three vowels: the [+back] /a/, /o/, and /u/. On the other hand, if /ṣ/ were posited as underlying the laminal alveolars [s̆] and [s̆ʸ], then the phonemic distribution of the alveopalatal fricatives would be very skewed and unnatural: /ṣ/ would then occur before all five vowels, while /š/ would occur only before /a/. Analyzing /š/ as the underlying form of [s̆] and [s̆ʸ] therefore leads to a much more natural and credible situation in which /š/ and /ṣ/ each occurs before three different vowels. Thus, all of the phonological evidence consistently favors /š/ over /ṣ/ as being the underlying representation of the laminal alveolar fricatives [s̆] and [s̆ʸ].

Having arrived at this conclusion, I will now summarize in chart form the phonetic distribution of the three fricative phonemes I have posited in syllable-initial position:

(10)

	i	e	a	o	u
/s/	si	se	sa	so	su
/š/	s̆i	s̆ʸe	ša	X	X
/ṣ/	X	X	ṣa	ṣo	ṣu

3 Syllable-final [s̆]

Up to this point in the discussion, the analysis has been fairly straightforward. However, when the laminal alveolar fricative [s̆] is analyzed in terms of its appearance in syllable-final position, the picture becomes much more complex. The reason is that in this position,

there appears to be a four-way contrast between [s], [s̆], [š], and [ṣ̌]. Observe, for example, the contrast in the following forms in the environment [a__k]:

(11)›	for [s̆]:	[kás̆ki]	'head'
		[ás̆kos]	'Let's...!'
	for [š]:	[aškodlóli]	'arrow'
	for [ṣ̌]:	[maṣ̌kóhpe]	'beach, sand'
		[uláṣ̌ki]	'I throw out'
		[waṣ̌kadlá?ti]	'I kill'
	for [s]:	[anaskahnéye]	'something'
		[askódli]	'heron'
		[šawalásko]	'midnight'
		[uhtačaskí?ts]	'I remember'

Further contrasts can be observed in the following forms in the environment [i__k]:

(12)›	for [s̆]:	[ís̆ka]	'then'
		[is̆kána]	'already'
	for [š]:	[s̆iliška?tepíči]	'bow'
		[tilíška]	'all'
	for [ṣ̌]:	no examples	
	for [s]:	[išakatiskádle]	'abandoned'
		[itiská?ne]	'alone'
		[upa?líski]	'I send, command'

The forms listed in (11) and (12) above present a problem to the analysis posited in the previous section. Recall that in syllable-initial position, all occurrences of the laminal alveolar fricatives [s̆] and [s̆ʸ] can be analyzed as allophones of /š/. Now, however, in a syllable-final environment, [s̆] and [š] present a strong contrast and apparently cannot be assigned to the same phoneme. In other words, it seems to be the case that we must now recognize not three, but four fricative phonemes among the inventory of underlying

sibilants in Chamicuro. This would mean that the phonemic system of sibilants loses its symmetry and must now include a seventh segment:

(13)

	apical alveolar	laminal alveolar	alveopalatal	retroflexed alveopalatal
voiceless affricates	t^s		č	ç̌
voiceless fricatives	s	s̆	š	ṣ̌

This distribution of sibilants in Chamicuro is very unnatural in the sense that there are more contrasting fricatives in syllable-final position than there are in syllable-initial position. Normally, the syllable-initial (intervocalic) position is where the greatest number of contrasts would be expected to surface, while one would expect any neutralization to occur in syllable-final position. The reason is that the syllable onset is often intervocalic and therefore more stable, whereas the coda position is often more dynamic in terms of phonological changes and neutralizations, being at the end of the rhythm wave. Note Hooper's comments concerning syllable codas:

> The strong and weak consonantal positions in the syllable are distinguished by the number of contrasts that are possible in the position... Second position and syllable-final position have a much smaller inventory of occurring segments... Some contrasts are actually neutralized in syllable-final position (Hooper 1976:200).

With Chamicuro the situation is reversed: there are three contrasting fricatives in syllable-initial position, but four in syllable-final position. This is a very marked system. Consequently, at least three advantages would be gained if we could predict in some way the occurrence of [s̆] in syllable-final position: (a) it would lower the inventory of sibilant phonemes from seven to six; (b) it would restore the symmetry in the sibilant system which is lost when seven phonemes are posited; and (c) it would make the pattern of distribution of the fricative phonemes much more natural and unmarked with respect to the number of contrasting segments in onset vis-a-vis coda position.

4 Possible solutions

I have just shown that it would be advantageous to predict the occurrence of all syllable-final [s̆]'s so as to be able to conclude that [s̆] is not a contrastive phoneme in Chamicuro. Let us examine and evaluate two possible solutions.

4.1 /tˢ/

The first possibility would be to claim that whenever [š̲] occurs in a syllable-final position, it is an allophone of /tˢ/. There are two factors relating to the distribution of [š̲] and [tˢ] which suggest this as a possible analysis. In the first place, the phone [tˢ] never occurs in syllable-final position. Therefore, the two phones [š̲] and [tˢ] are in complementary distribution with respect to syllable-final position in Chamicuro.

Secondly, another factor which motivates the possibility of analyzing syllable-final [š̲]'s as allophones of /tˢ/ is the fact that in many cases, the Chamicuro speakers optionally pronounce some of these [š̲]'s as laminal alveolar affricates, i.e., [tˢ]. In other words, there appears to be free variation between [š̲] and [tˢ] in words such as [káš̲ki] ~ [kátˢki] 'head,' [óš̲lo] ~ [ótˢlo] 'species of pig,' [píš̲lo] ~ [pítˢlo] 'hummingbird,' [ipíš̲le] ~ [ipítˢle] 'its wing,' etc. This is another piece of evidence which would support an analysis by which all occurrences of syllable-final [š̲] are derived from an underlying /tˢ/.

Nevertheless, the question remains of whether this solution is the correct one. Although this analysis is phonologically plausible and does account for all the available data, it does not appear to be the best solution. Positing /tˢ/ as the underlying representation of syllable-final [š̲]'s does not seem to be psychologically real to the Chamicuro speakers. When I pronounce words such as [káš̲ki] 'head' with [tˢ] rather than [š̲] (i.e., [kátˢki]), the native speakers immediately and consistently reject them. They respond much more favorably when those same words are pronounced with [š] rather than [tˢ]. For example, [káški] is accepted as a correct alternate pronunciation of [káš̲ki]. This suggests that all occurrences of [š̲], both syllable-initially and syllable-finally, should be derived from an underlying /š/. Such a solution is more consistent with other details of the analysis and is more in line with the Chamicuro speakers' intuitions about their own language. Therefore, let us lay aside the /tˢ/ analysis and consider as a second possibility a more interesting and plausible solution.

4.2 /ši/ coalescence

Another possible solution to the problem of syllable-final [š̲]'s involves positing an underlying sequence /ši/ which coalesces to form [š̲]. This solution is somewhat abstract since, as a general rule, there is no direct phonetic evidence of an underlying /i/ following the sibilant in question. According to this analysis, a word such as [káš̲ki] 'head,' for example, would be derived from the underlying form /kašiki/ in the following way: first the underlying /š/ would be fronted and become [š̲] in accordance with the fronting rule discussed earlier. Then the post-sibilant /i/, which triggered the š fronting, would be deleted by a syncope-type rule which will be discussed later in this section. Since this solution is abstract, it needs to be strongly justified with concrete evidence. Let us consider several facts

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relating to this analysis which confirm the possibility of a coalescence solution.

In the first place, there is good phonological motivation for deriving syllable-final [ǧ]'s from an underlying /š/ since, as has been shown, all syllable-initial occurrences of [ǧ] are allophones of /š/ as well. Since there is independent motivation for the š fronting rule, it would be cost-free to the grammar to allow this rule to handle the surface occurrences of syllable-final [ǧ] as well.

Secondly, synchronic Chamicuro morphology appears to exhibit remnants of a historical syncope process by which the vowel /i/ is elided following the phoneme /š/ in a limited number of words. Consider, for example, the word [náǧi] 'corn.' Phonemically, this word should be analyzed as /naši/ due to patterns of complementary distribution, as discussed earlier. When certain types of nouns in Chamicuro are possessed, they require one of several possessive suffixes as well as a personal prefix which agrees with the person and number of the possessor. Thus 'my corn' would be composed morphologically of the first person singular possessive prefix /u-/, followed by the noun root /naši/, followed by the possessive suffix /-ne/: /u-naši-ne/. However, in actuality this word is pronounced as [unáǧne], that is, for some reason the underlying /i/ has been deleted, after the preceding /š/ has been fronted to [ǧ]. Likewise, [míǧi] 'cat,' when possessed, becomes [u-míš-ne] or [u-miǧí-ne] 'my cat.' Both of these pronunciations are attested. However, the deletion of the post-sibilant /i/ is not a regular morphophonemic process which operates consistently in Chamicuro; it appears to be limited to a handful of words analogous to /u-miši-ne/. The freely alternating forms [umíšne] and [umiǧíne] 'my cat' provide support for the analysis by which syllable-initial [ǧ]'s are derived from an underlying /š/, since in at least one of the attested pronunciations the sibilant surfaces as [š]. In addition, the two possessed forms [unáǧne] 'my corn' and [umíšne] 'my cat' hint at the prior existence of a historical syncope process by which underlying /i/'s were elided in certain morphophonemic environments following the phoneme /š/.

Thirdly, various aspects of the behavior of one particular noun root also tend to confirm an abstract /ši/ ⟶ [ǧ] coalescence solution. In Chamicuro the word for 'fingernail' or 'claw' is pronounced [ǧtó]. Although in this case the [ǧ] is obviously syllable-initial rather than syllable-final, for all practical intents and purposes it patterns exactly the same as any other [ǧ] which occurs preceding a consonant in surface forms. One thing which is curious about the word [ǧtó] is that it is the only monosyllabic noun root discovered to date in the entire language. That is, of the 444 nouns which have been analyzed up to this point, every single one except [ǧtó] is built from a root having at least two phonetic syllables. [ǧtó] 'fingernail' is the only exceptional one which, on the surface at least, is composed of only one syllable. This should make us suspect that underlyingly it does contain two syllables. Thus, by positing an abstract underlying form such as

/šito/, we could make this root consistent with all the other noun roots in the language insofar as the number of syllables is concerned.

In addition, on one occasion one of the Chamicuro speakers actually pronounced this word as [šitó], that is, with a weak, transitional [i] following the [š]. The [i] which I heard in this word was definitely not palatalization, nor did I perceive it as a lengthening of the [š] or as a syllabic [š]. Rather, it was clearly vocalic in nature, although it may have been voiceless, and was undoubtedly not a regular, full [i]. This fact also confirms that, at least in some cases, [š]'s which are followed by a consonant in their phonetic forms are actually followed by an /i/ in their underlying forms.

Finally, one other incident relating to the word [štó] 'fingernail' also confirms the /ši/ coalescence solution at which we have been aiming. One of the two Chamicuro speakers with whom I have worked is literate in Spanish. At one point in our study of the language, but before I had done any phonological analysis, I asked him to write down some of the Chamicuro words for me, using Spanish orthography as well as he could. I instructed him to write an underlined *s* (*s*) whenever he heard the sound [š]. When we got to the word for 'fingernail' ([štó]), he wrote it as *gito*!

In similar fashion, on another occasion the one literate Chamicuro speaker also wrote in an *j* in the analogous word [aškósi] 'Let's...!,' spelling it as *ashicosi*. This again supports the conclusion that, at least for this one word, an [š] which is phonetically syllable-final should be derived from the underlying sequence /ši/.

Finally, there is one other line of evidence which also serves to confirm an abstract coalescence solution. Observe in (14) below a comparative list of cognate words from nine different Maipuran Arawakan languages for the form meaning 'claw' or 'fingernail.'

(14)

Proto Maipuran	*s	eu	t	a	
Amuesha	-š	e:	č		(ehp)
Chamicuro	š		t	o	
Piro	s	ewa	t	a	
Apurina	-s	oo	t	a	
Machiguenga	š	a	t	a-	
Asheninca	sy	e	t	a-	
Resigaro	-h	i?	t	á	[ví]
Curripaco	-t^s	o	t	a	
Yavitero	t^s	ú	l	a	[wi]

(Payne, forthcoming).

It is interesting to note that the Chamicuro form [što] is the only one which lacks a vowel in the first syllable, after the initial sibilant (or /h/). This fact suggests that at some point in its

development Chamicuro did have a vowel in the initial syllable of this word.

All of the facts mentioned above constitute tantalizing evidence for positing an abstract underlying /i/ which coalesces with a preceding /š/ to yield an alveolar [ǧ]. Phonetically, this [ǧ] then ends up being in a coda position. This solution has much more confirmatory evidence in its favor than does the /tˢ/ solution outlined in the previous section. First, by deriving syllable-final [ǧ]'s from an underlying /š/, we can deal with all of them by means of the same rule which accounts for syllable-initial [ǧ]'s as well. Secondly, there are morphophonemic remnants of a historical syncope process which accounts for the elision of certain /i/'s after the segment /š/. Additionally, orthographic peculiarities written by one of the Chamicuro speakers constitute psycholinguistic evidence arguing for the existence of an underlying /i/ in the words [ǧtó] 'fingernail' and [aǧkósi] 'Let's...!' Finally, when Chamicuro is compared with other Arawakan languages, it stands out as the only one in which the word for 'fingernail' has only one syllable.

All of the relevant phonological facts discussed up to this point seem to point in the direction of an abstract /ši/ coalescence solution. However, a further problem now presents itself: if all syllable-final [ǧ]'s are to be derived from the underlying sequence /ši/, under what conditions does this /i/ delete? We must account for the elision of the relevant /i/'s in some rule-governed way if we are going to posit a coalescence solution. In other words, certain words containing an underlying sequence /ši/ surface phonetically with the sequence [ǧi], e.g., [kiǧíli] 'mouse.' In these cases, the alveolar [ǧ] is predicted by the š fronting rule. However, what is crucial is that in words such as this one, the underlying /i/ (following the /š/) is *not* deleted. In other cases, words containing an [ǧ] followed by a consonant in their phonetic forms are also derived from underlying forms which contain the sequence /ši/, e.g., /šito/ ⟶ [ǧtó] 'fingernail.' For some reason, the /i/'s which trigger š fronting are elided in some words but not in others. Let us present some relevant data to see what types of patterns emerge.

An inspection of the two words in (15) below shows that the loss or retention of the relevant /i/'s takes place in phonologically analogous environments:

(15)› a. [píǧle] 'wing'

b. [kiǧíli] 'mouse'

The underlying forms posited for these words are as follows:

(16)› a. /pišile/

b. /kišili/

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How can we account for the fact that the second /i/ of /pišile/ is elided while the corresponding /i/ of /kišili/ is not? We cannot appeal to the presence or absence of underlying stress since Chamicuro exhibits a very regular pattern of penultimate stress assignment. That is, underlyingly, *all* vowels are unstressed, and the rule of penultimate stress assignment must apply *after* the /i/ deletion or syncope rule, as shown by the form [píp̆le]:

(17) Syncope before Stress Assignment

	/kišili/	/pišile/
š Fronting	kiš̆ili	piš̆ile
Syncope	----	piš̆le
Stress Assignment	kiš̆íli	píš̆le
	[kiš̆íli]	[píš̆le]

If, on the other hand, penultimate stress assignment were to apply before the syncope rule, then the second /i/ of /pišile/ would become stressed and would therefore not undergo syncope:

(18) Stress Assignment before Syncope

	/kišili/	/pišile/
š Fronting	kiš̆ili	piš̆ile
Stress Assignment	kiš̆íli	piš̆íle
Syncope	----	----
	[kiš̆íli]	*[piš̆íle]

Therefore, since the placement of stress in Chamicuro is rule-governed, we cannot appeal to underlying stress in order to distinguish those /i/'s which delete from those which do not.

Consider also the following pair of derivations:

(19)> a. /wešitihki/ > [weš̆tíhki] 'I tie up'

b. /mašilikeli/ > [maš̆ilikéli] 'anteater'

Once again, the problem arises of how to account for the loss of the first /i/ of /wešitihki/ without also deleting the corresponding first /i/ of /mašilikeli/.

A careful study of these and other analogous forms reveals that there simply does not seem to be any pattern to the /i/ elision rule. This does not mean, however, that the /ši/ coalescence solution must ultimately be rejected. As we have seen, this solution accounts for so many phenomena in such an intuitive way, and it has quite a bit of

confirmatory evidence in its favor. The problem is that there is no way to predict /i/ deletion in a consistent and rule-governed fashion. I suspect that the phenomenon of /ši/ coalescence in Chamicuro is an example of an incoming rule which is still in a transitional stage of acceptance into the language and is therefore currently in flux. I would predict that, given enough time, the pattern of its application would become more regular and obvious.

5 Concluding remarks

What do we do then with syllable-final [š̆]'s? One possibility is to recognize the phonetic contrast between [š̆] and [š] in the coda position and conclude that Chamicuro has a fourth fricative phoneme, /š̆/. However, as was stated earlier, I hesitate to go to that extreme. The inventory of sibilant phonemes seems to be so complete and symmetrical when it is limited to six. Also, all the evidence I can bring to bear on the issue points to the conclusion that the Chamicuro speakers react to all alveolar [š̆]'s as though they were phonemically an /š/. Thus I would posit that all [š̆]'s should be derived either from an underlying /š/ or from the abstract sequence /ši/. In other words, the underlying form of, for example, [kiš̆íli] 'mouse' would be /kišili/; that of [píš̆lo] 'hummingbird' would be /pišilo/, with an abstract /i/; and that of [tilíška] 'all' would obviously be /tilišk̆a/.

Theoretically speaking, the deletion of certain underlying /i/'s after the fronted [š̆] is an unusual and interesting phenomenon since it entails the claim that a relatively abstract rule (syncope) applies *after* a low-level allophonic rule (š fronting). The latter rule undoubtedly applies in the postlexical component of the grammar, yet it is necessarily ordered before the *i* deletion rule, which in many respects behaves like a lexical rule.

As far as practical matters are concerned, it seems to work well in the orthography we have developed to represent all [š̆]'s, as well as all [š]'s, with the same digraph, *sh*, and to leave out the abstract /i/ when it does not show up in the phonetic form. Thus, [kiš̆íli] is represented as *kishili*, [píš̆lo] is written *pishlo*, and [tilíška] is of course *tilishka*. Since no minimal pairs have been discovered which contrast [š̆] and [š] in a syllable-final position, the Chamicuros seem to get the right pronunciation of all *sh*'s every time, without confusion. And that, after all, is the ultimate purpose of an orthography.

APPENDIX: ADDITIONAL DATA

The following forms further illustrate the phonological patterns exemplified throughout the discussion. I list these data here for those who may have interest in pursuing the analysis in more depth. The number in parentheses before each group of forms corresponds to the appropriate numbered example presented earlier in the discussion.

(6)	#ša...			#ša...	
	a.	[šáki]	'vagina'	e.	[šamleʔčóma]	'coward'
	b.	[šáni]	'wasp'	f.	[šáʔme]	'shade'
	c.	[šašáka]	'old'			
	d.	[šakíʔsu]	'tick (n.)'			
(7)	...Vša...			...Vša...	
	a.	[češána]	'deer'	c.	[ulušána]	'my godfather'
	b.	[šašáka]	'old'	d.	[maʔlušána]	'termite'
				e.	[pušána]	'sister-in-law'
				f.	[tíša]	'toad'
				g.	[kašáhpa]	'piranha'
(8)	/#ši.../					
	a.	[šɨɬtóki]	'drum'			
	b.	[šinitaçomádlo]	'drunkard'			
(9)	/...Vši.../			/...Vše.../	
	a.	[ihtíši]	'root'	f.	[kamášʸe]	'iguana'
	b.	[kahpíši]	'rodent sp.'	g.	[kašʸeleʔtáka]	'dead'
	c.	[náši]	'corn'	h.	[umašʸentatádle]	'I help'
	d.	[usadlišíni]	'my niece'	i.	[pošʸéwa]	'dry'
	e.	[yíši]	'its tail'	j.	[kišʸemódlo]	'thread'
(11-12)	...VšC...			...VsC...	
	a.	[kašpádlo]	'opossum'	r.	[senesyáko]	'day'
	b.	[óšlo]	'sp. of pig'	s.	[časkódlo]	'stick'
	c.	[píšle]	'wing'	t.	[naspéhka]	'piece'
	d.	[píšlo]	'hummingbird'	u.	[itísna]	'hill'

e. [úǧto] 'my fingernail'

f. [weǧtíhki] 'I tie up'

g. [itotikíǧte] 'they came up-river'

...VǰC...

h. [či?naštadlíči] 'town'

i. [ašmudle?kódlo] 'wooden club'

...VǰC...

j. [čpóǰka] 'afternoon, late'

k. [ǧipotoǰka?ǰo?lóči] 'shotgun'

l. [ulawuǰyáko] 'my hernia'

m. [upamoǰóǰki] 'I push'

n. [uǰnáke] 'my hammock'

o. [wapuǰkádle] 'I break'

p. [yaǰtíhka] 'he/it stops'

q. [yíǰna] 'stingray'

v. [kapapeskahpódlo] 'ambitious'

w. [ukasostádle] 'I accept'

x. [čísti] 'bird'

y. [mašapulísta] 'first'

z. [peski?túhka] 'slow'

aa. [pestíklo] 'insect sp.'

bb. [ukasósti] 'I obey'

cc. [upa?pésne] 'I finish'

dd. [kaǧ^{y}elísple] 'snake sp.'

ee. [mespíhča] 'rope'

ff. [paspatáli] 'raft'

gg. [ustawáli] 'sleeping mat'

hh. [usenústi] 'I perspire'

ii. [túsna] 'back, shoulders'

jj. [uskáᵂna] 'my father'

kk. [upeski?tádle] 'I prepare'

ll. [peswatádlo] 'fresh, new'

(15, 16, 19)

a. /išika/ > [íǧka] 'then'

b. /kašiki/ > [káǧki] 'head'

c. /kašipalo/ > [kaǧpádlo] 'opossum'

d. /ošilo/ > [óǧlo] 'species of pig'

e. /pišilo/ > [píǧlo] 'hummingbird'

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f.	/ušito/	>	[úǧto]	'my fingernail'
g.	/itotikišite/	>	[itotikíǧte]	'they came up-river'
h.	/ašikosi/	>	[aǧkósi]	'Let's...!'
i.	/yašitewusketuhkana/	>	[yaǧtewusketuhkána]	'it shook itself'
j.	/išila/	>	[íǧla]	'already'

Compare:

k.	/šihpa/	>	[ǧíhpa]	'hand'
l.	/šikečpalo/	>	[ǧikečpádlo]	'witch'
m.	/šileti/	>	[ǧiléti]	'rat'
n.	/šiltoki/	>	[ǧɬtóki]	'drum'
o.	/šinitaçomalo/	>	[ǧinitaçom[illegible]lo]	'drunkard'
p.	/e:šili/	>	[e:ǧíli]	'fish sp.'
q.	/ihtiši/	>	[ihtíǧi]	'root'
r.	/kahpiši/	>	[kahpíǧi]	'rodent sp.'
s.	/mu:šihki/	>	[mu:ǧíhki]	'peanut'
t.	/naši/	>	[náǧi]	'corn'
u.	/usališini/	>	[usadliǧíni]	'my niece'
v.	/yiši/	>	[yíǧi]	'its tail'
w.	/ušini/	>	[uǧíni]	'my baby'
x.	/šiliška?tepiči/	>	[ǧiliška?tepíči]	'bow'
y.	/çomahši/	>	[çomáhǧi]	'grass'
z.	/ušiǧulti/	>	[uǧiǧúɬti]	'I pull'

ABBREVIATIONS

sp.	species	n.	noun

NOTES

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1. For additional data illustrating these same patterns, see the appendix. Henceforth, numbered examples containing data which are supplemented by additional corresponding forms in the appendix will be marked with a > after the number of the example, e.g., (7)>.

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